

Simply Radical

Reporting Category Expressions and Operations

Topic Simplifying square roots and cube roots of algebraic expressions

Primary SOL A.3 The student will express the square roots and cube roots of whole numbers and the square root of a monomial algebraic expression in simplest radical form.

Related SOL A.2, A.4

Materials

- Graphing calculators (optional)
- Index cards

Vocabulary

square root, perfect square, squaring, cubing (earlier grades)

simplest radical form, radicand, cube root (A.3)

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

1. Review simplifying square roots of whole numbers by asking students how they would express $\sqrt{432}$ in simplest radical form. Give them some time to find the answer on their own, and then have them share their strategies.
2. Display $\sqrt{x^2y^3z^4}$, and ask students how they would express this algebraic expression in simplest radical form. After allowing them some time to think, let them work with partners or in small groups to find the answer. Emphasize that they will need to be able to explain their strategies.
3. Have students share strategies. As students are sharing, ask questions to help them connect simplifying the square root of a whole number to simplifying the square root of an algebraic expression. Ask students how they are the same and how they are different.
4. Have each pair create a square root of a monomial algebraic expression and find its simplest radical form. Then, distribute index cards, and have pairs rewrite their square roots on the cards and exchange them with other pairs. Once pairs have simplified the new expressions, have them discuss and verify their solutions with each other for accuracy.
5. Review the concepts of exponents. Tell students that there are more than just square roots: there are also cube roots, fourth roots, fifth roots, and so forth. Demonstrate the notation for these functions.
6. Have students think about how simplifying a cube root might compare to simplifying a square root. After a few moments, allow them to discuss their ideas with their partners. Have students share what they think might be similar and what might be different.
7. Have students work with their partners to simplify $\sqrt[3]{135}$. Then, have students share strategies in a class discussion.

Assessment

- **Questions**
 - When would the cube root of a number be an integer?
 - How could you find the two consecutive integers between which a cube root lies?
- **Journal/Writing Prompts**
 - Compare and contrast simplifying square roots of whole numbers and square roots of monomial algebraic expressions.
 - Compare and contrast simplifying square roots and cube roots.
- **Other**
 - Have students practice expressing square roots of monomial algebraic expressions in simplest form.
 - Have students practice expressing cube roots in simplest form.

Extensions and Connections (for all students)

- Prompt students to think about how they would simplify a cube root of a monomial algebraic expression.
- Prompt students to think about how they would simplify an n th root.

Strategies for Differentiation

- Have students create a flow chart showing the steps of their strategy for simplifying a square root and a cube root.
- Suggest students expand out radicand expressions, and have them circle triples when they are simplifying cube roots and circle pairs when simplifying square roots.